

**From:** Miller, Ann  
**To:** [Clement, Joel](#)  
**Cc:** [Simon, Benjamin](#); [Shawn Buckner](#)  
**Subject:** Re: BENM  
**Date:** Thursday, June 15, 2017 10:43:28 AM  
**Attachments:** [Bears Ears Review\\_06\\_14\\_17\\_2.docx](#)

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Hi Joel,

Here is a copy with your suggestion incorporated and stripped of comments.

Ann

On Thu, Jun 15, 2017 at 10:05 AM, Clement, Joel <[joel\\_clement@ios.doi.gov](mailto:joel_clement@ios.doi.gov)> wrote:  
Indeed I may not have. Let's try again.

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Joel Clement - Director, Office of Policy Analysis, U.S. Department of the  
Interior 202.208.3295

On Thu, Jun 15, 2017 at 9:59 AM, Simon, Benjamin <[benjamin\\_simon@ios.doi.gov](mailto:benjamin_simon@ios.doi.gov)>  
wrote:

Hi,

You may not have attached the document with your edits...

Ben

On Thu, Jun 15, 2017 at 9:53 AM, Clement, Joel <[joel\\_clement@ios.doi.gov](mailto:joel_clement@ios.doi.gov)> wrote:

Ok looks good thanks. I offered an alternative to an awkward sentence in the last  
section, but otherwise looks good to go! Shoot me a clean version when you're able,  
thanks.

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Joel Clement - Director, Office of Policy Analysis, U.S. Department of the  
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On Thu, Jun 15, 2017 at 9:38 AM, Simon, Benjamin <[benjamin\\_simon@ios.doi.gov](mailto:benjamin_simon@ios.doi.gov)>  
wrote:

Hi Joel,

Here is the paper in track change with your edits/comments incorporated.

Ben

On Wed, Jun 14, 2017 at 3:47 PM, Clement, Joel <[joel\\_clement@ios.doi.gov](mailto:joel_clement@ios.doi.gov)> wrote:

My edits attached, thanks. Most of them are for style or clarity, but a couple relate to  
data (SJ County pop is not 5% of Utah, if the numbers are correct). If Shawn doesn't  
have more edits, than this can be made final and I'll send to Randy. Thanks guys,  
this will be very helpful going forward, in my view.

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Joel Clement - Director, Office of Policy Analysis, U.S. Department of the Interior 202.208.3295

On Sun, Jun 11, 2017 at 3:08 PM, Simon, Benjamin

<[benjamin\\_simon@ios.doi.gov](mailto:benjamin_simon@ios.doi.gov)> wrote:

Hi Joel,

We received edits/comments from the DOI bureaus and the FS on the BENM paper and made revisions to accommodate. The revised version is attached. We also drafted a one page summary which is also attached.

Ben

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# Bears Ears National Monument

Economic Values and Economic Contributions

*DRAFT*



Bears Ears  
National  
Monument

## Introduction

The purpose of this paper is to provide information on the economic values and economic contributions of the activities and resources associated with Bears Ears National Monument (BENM) as well as to provide a brief economic profile of San Juan County.<sup>1</sup>

## Background

The Bears Ears National Monument encompasses 1.35 million acres of land in San Juan County, UT and was established in 2016 for the purposes of protecting lands that contained cultural, prehistoric, historic, geologic, and scientific resources, including objects of archaeological significance. Prior to establishment of the Monument, all lands within the Monument boundaries were Federal lands managed by BLM (Monticello Field Office) and the USFS (Manti-La Sal National Forest), with the exception of about 100,000 acres of land owned by the State of Utah (managed by the Utah School and Institutional Trust Lands Administration (SITLA)) and smaller private parcels.<sup>2</sup> Of the BLM and Forest Service acreage, 57% was managed with some level of protective designation under the existing land use plans as Natural Areas, Areas of Critical Environmental Concern, and Special Recreation Management Areas; or as designated Wilderness Study Areas. There have been several previous proposals to protect land in the Bears Ears area.<sup>3</sup>

A management plan for the Monument has not yet been drafted. Development of a management plan is anticipated to require 5 years and involve extensive public involvement.<sup>4</sup> The Presidential proclamation established the Bears Ears Commission, consisting of one elected official each from five different tribes (Hopi Tribe, Navajo Nation, Ute Mountain Ute Tribe, Ute Indian Tribe of the Uintah Ouray, and Zuni

### Bears Ears National Monument

Location: San Juan County, UT

Managing agencies: BLM, USFS

Adjacent cities/counties/reservations:

- Counties: San Juan County, UT
- Reservations: Navajo Nation
- Cities: Bluff, UT; Blanding, UT; Monticello, UT; Navajo Nation Reservation

<sup>1</sup> The BLM and Forest Service provided data used in this paper.

<sup>2</sup> SITLA serves as fiduciary of Utah's 3.4 million acres of trust lands, parcels of land held in trust to support 12 state institutions, primarily the K-12 public education system. SITLA is constitutionally mandated to generate revenue from trust lands to build and grow permanent endowments for these institutions. Utah's public school system is the largest beneficiary, holding 96% of all Utah trust lands. Economic activities occurring on SITLA land in the area are similar to those on adjacent Federal land, including visitation to prominent cultural resource sites and livestock grazing. Different rules apply to grazing on SITLA land versus Federal land, such as allowing SITLA to post expiring permits on the agency's website, establish 15 years as the maximum length for grazing permits, and set a fee of \$10/Animal Unit Month (AUM) when permits are assigned. The 2016 BLM grazing fee was \$2.11/AUM. The Forest Service grazing fee was \$2.11/Head Month (HM). AUMs and HMs are treated as equivalent measures for fee purposes.

<sup>3</sup> Proposals to protect land in the Bears Ears area date back over 80 years. In 2015, the "Inter-Tribal Coalition for Bears Ears" proposed establishing a 1.9 million acre national monument.<sup>3</sup> Utah Congressmen Rob Bishop and Jason Chaffetz proposed establishing two National Conservation Areas (NCAs) -- Bears Ears and Indian Creek -- totaling 1.3 million acres as part of their Public Lands Initiative (PLI). National Conservation Areas are designated by Congress. In contrast to the Inter-Tribal Coalition's proposal, the PLI did not specify that all areas were to be withdrawn from future mineral development, placed a restriction on decreasing grazing permits in one of the proposed NCAs, and placed restrictions on Federal negotiations with the State of Utah for land exchanges for State-owned land within the proposed boundaries.

<sup>4</sup> Land management plans are developed in compliance with the Federal Land Policy and Management Act (FLPMA) and NEPA regulations, the National Forest Management Act (NFMA), and the Forest Service 2012 Planning Rule.

Tribe). The Commission is to work with the Federal government to provide guidance and recommendations on the development and on-going implementation of management plans. The Proclamation also requires a Monument Advisory Committee (MAC) be established according to the Federal Advisory Committee Act (FACA) regulations. In addition, DOI sought to enter into a MOU with the State of Utah to negotiate the exchange of state land within the Monument boundaries for other BLM land outside the Monument.<sup>5</sup>

### Public outreach prior to designation

A public meeting was held in Bluff, UT in July 2016. Over 1,500 individuals attended, including representatives from DOI, USDA, tribes, members of the Utah congressional delegation, and Utah state legislature. In addition, almost 600 written comments were submitted, the majority of which were in favor of the Monument designation.<sup>6</sup>

### Local Economy and Economic Impacts

Table 1 presents socio-economic metrics for San Juan County and the state of Utah. The County contains roughly 0.5% of the State's population. The population of the county increased about 5% from 2000 to 2015. Nearly half of the population of the county is Native American. The median household income of Native Americans in San Juan County is over 40% lower than that of the total county population (see Table 1). The county has historically experienced higher levels of unemployment and lower levels of median household income in comparison to the State.

The San Juan County economy is dependent upon recreation-based or tourism-based businesses.<sup>7</sup> The accommodation and food services industry is the largest sector by employment (see Figure 1), accounting for about 30% of total employment in the county.<sup>8</sup>

Table 1. San Juan County and State of Utah Economic Snapshot

Measure	San Juan County, UT	Utah
Population, 2016 <sup>a</sup>	15,152	2,903,379
Native American % of population <sup>a</sup>	47.0%	1.1%
Employment, December 2016 <sup>c</sup>	2,299	1,187,682
Unemployment rate, March 2017 <sup>b</sup>	7.0%	3.1%
Median Household Income, 2015 <sup>a</sup>	\$41,484	\$60,727
Native American Median Household Income, 2015 <sup>a</sup>	\$24,132	\$36,428

<sup>a</sup> U.S. Census Bureau, 2011-2015 American Community Survey

<sup>b</sup> <http://www.jobs.utah.gov/wi/pubs/une/season.html>.

<sup>c</sup> [https://data.bls.gov/cew/apps/data\\_views/data\\_views.htm#tab=Tables](https://data.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables)

<sup>5</sup> A May 2017 SITLA land auction included a 1,120 acre parcel within BENM, the Needles Outpost, which sold for \$2.5 million, or \$2,232 per acre (<https://trustlands.utah.gov/land-auction-earns-3-million-for-public-schools/>).

<sup>6</sup> Fast Facts and Q&A about the Bears Ears National Monument Designation, BLM.

<sup>7</sup> Approved Resource Management Plan for Monticello Field Office, 2008

<sup>8</sup> U.S. Census Bureau County Business Patterns, 2015



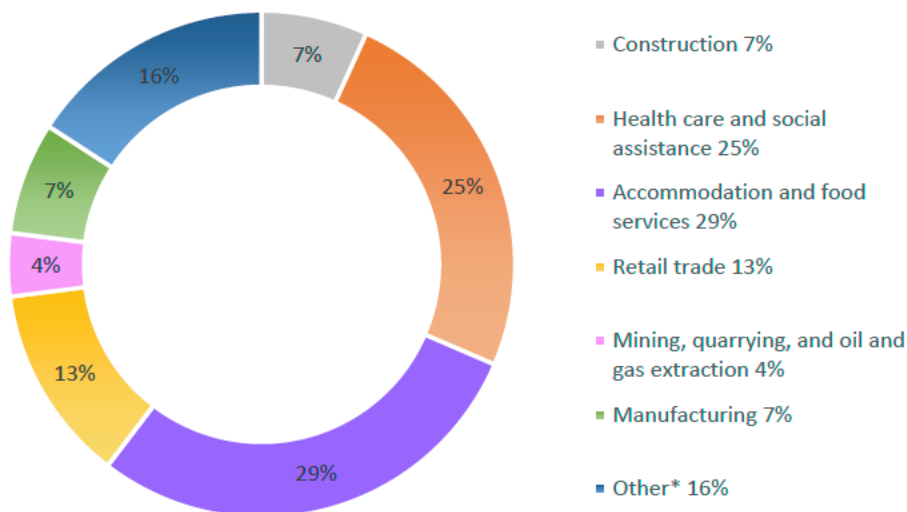


Figure 1. Percent of employment by sector in San Juan County, 2015

\*Other includes agriculture/forestry; utilities; wholesale trade; finance and insurance; real estate; professional, scientific and technical services; admin and support services; waste management; educational services; arts and entertainment; and transportation and warehousing. Each of these represents less than 4% of total employment. Source: 2015 County Business Patterns, U.S. Census Bureau.

The figures provided below represent two different types of economic information: “economic contributions,” and “economic values.” Both types of information are useful for decision making. Economic contributions track expenditures as they cycle through the local and regional economy, supporting employment and economic output. *Table 2* provides estimates of the economic contribution of activities associated with BENM. It is estimated that recreation activities in the BENM area supported about 460 jobs and provided about \$23 million in value added in FY 2016.

#### Definitions

**Value Added:** A measure of economic contributions; calculated as the difference between total output (sales) and the cost of any intermediate inputs.

**Economic Value:** The estimated net value, above any expenditures, that individuals place on goods and services; these are particularly relevant in situations where market prices may not be fully reflective of the values individuals place on some goods and services.

**Employment:** The total number of jobs supported by activities.

Economic values, in contrast to economic contributions, represent the net value, above and beyond any expenditures, that individuals place on goods and services.<sup>9</sup> To the extent information is available, economic values are presented in *Table 3* along with information on the timing and drivers of future activity. For commodities bought and sold in markets (e.g., oil, gas, etc.), the economic values are closely related to the market prices of the commodities. For goods and services – such as recreation – that are

<sup>9</sup> It is not appropriate to sum values for economic contributions and economic values because they represent different metrics.

typically not bought and sold in markets, the values are estimated based on visitor surveys which attempt to capture individual values above and beyond their direct expenditures. The economic value in FY 2016 associated with recreation is estimated to be about \$30 million.

### *Activities and Resources Associated With Bears Ears National Monument*

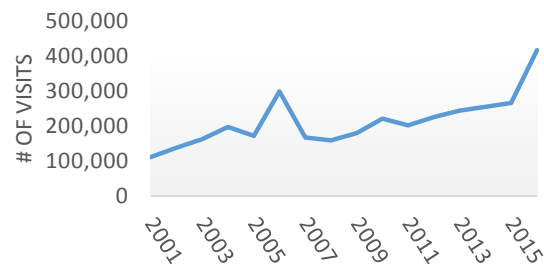
Information on the economic contributions associated with the activities occurring at Bears Ears National Monument are provided below.

- **Recreation:** Annual recreation

visitation data for FY 2001-2016 is available for the BLM Monticello Field Office. About 60 percent of the area formerly under the jurisdiction of the Field Office represents the area included in the BENM. This area receives the vast majority of recreation use on BLM managed lands within the Field Office boundary. Recreation visits increased steadily from about 111,000 in FY 2001 to about 419,000 in 2016 (see Figure 2). In comparison, visitation to National Monuments and NCAs that have tracked unit-level visitation since 2005 has grown at an average rate of about 5.4% per year. Prior to designation, BLM also tracked the number of visits to the Kane Gulch ranger station that served the southern end of the Monument. The number of visits to this ranger station in March and April of 2017 was more than 50% higher than the average visitation during the same months of the four previous years.

Annual recreation visits to the Manti-La Sal National Forest, part of which is now within BENM boundaries, are estimated to number around 350,000. USFS estimates that around 35,000 visits are to the area that is now contained within Mounument boundaries. An increase in visitation to this area of the Manti-La Sal National Forest has been locally observed since designation.<sup>10</sup>

*Figure 2. Recreation Visits to BLM Monticello Field Office, 2001-2016*



Recreation activities provide the opportunity for economic activity to be generated from tourism for an indefinite period of time. The economic contributions occur annually, and in cases where visitation increases over time, recreation generates additional activity each year. These contributions affect the regional and state economies. Recreation activities based on visitation to BLM-managed land are estimated to contribute about \$23 million in value added (net economic

<sup>10</sup> USFS data.



contributions) and support 463 jobs;<sup>11</sup> these could be considered conservative estimates for the Monument area as a whole, as they do not include the impacts of visitation to USFS-managed land. Including the estimated 35,000 annual visits to the USFS-managed land, recreation activities based on visitation to all land within Monument boundaries are estimated to contribute about \$27 million in value added and support 473 jobs<sup>12</sup>; the values should be considered an upper bound as there may be some double-counting between visits to BLM-managed and to USFS-managed land.

- **Energy:** In general, the scope, magnitude, and timing of energy and minerals activities are closely related to supply and demand conditions in world markets and the market prices of mineral commodities. Local or regional cost considerations related to infrastructure, transportation, etc. also may play a role in defining the supply conditions. To date, energy development on the Monument has been limited.
  - **Coal.** There have been no coal developments in the Monument area. Furthermore, there is very little, if any, prospectively valuable coal within the Monument boundaries, based on the energy and mineral resource assessment conducted for BENM. Potential for prospectively valuable coal, as surveyed by the USGS, lies almost entirely to the east of the Monument.<sup>13</sup>
  - **Oil and gas.**
    - There are currently no producing oil and gas wells within the Monument. USGS assessments indicate a high level of potential for oil and gas for an assessment unit that includes the monument boundaries, though it is not scientifically valid to statistically assign energy resource numbers in an assessment unit to a specific area.<sup>14</sup> The upper northeast panhandle of BENM lies within the boundaries of the Moab Master Leasing Plan (approved in December 2016) and portions of the southeastern and southcentral areas of the Monument were included in a proposed San Juan Master Leasing Plan.<sup>15</sup> Approximately 63,600 acres within the proposed San Juan Master Leasing Plan area have been nominated for leasing since 2014. All of these lease nominations were deferred due to existing land use plan decisions and potential adverse impacts on cultural resources.
    - There are currently 25 existing federal oil and gas leases that are partially or wholly contained within the Monument boundaries on BLM-managed lands, with lease authorizations spanning the period from 1972 to 2012. Valid existing rights are protected under the proclamation, so development on these existing leases

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<sup>11</sup> BLM data

<sup>12</sup> USFS data.

<sup>13</sup> BLM data.

<sup>14</sup> The Monument area is within a USGS Energy Assessment Unit (AU) and has historic uranium mining activity (the Monument is within 2 conv. AUs and 1 cont. AU, Paradox Basin Province (315 MMBO, 999 BCF, 18 MMBNGL)<https://pubs.usgs.gov/fs/2012/3031/>.

<sup>15</sup> Master Leasing Plans (MLPs) establish a framework for determining which areas are appropriate for responsible exploration and development of minerals while protecting the area's conservation resources. MLPs also provide direction for resolving resource conflicts, protecting important conservation resources, and supporting outdoor recreation and other activities that benefit local communities and public land visitors. For additional information on the Moab MLP see <https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=99717>.

could occur if development is found to be economic. Currently, there are no authorized or pending applications for permit to drill (APDs) associated with these leases. No oil and gas wells have been drilled on existing leases since 1993 and all wells within Monument boundaries have been plugged. Of the 250 wells that have been drilled since 1920, only three wells have produced economical quantities of oil and gas. The last producing well was drilled in 1984 and ceased production in 1992.

- **Non -fuel minerals.**

- **Sand and gravel.** There is one commercial minerals materials mining site within Monument boundaries on BLM-managed land that produces sand and gravel. The permit for this site was renewed in March, 2016 for a 10-year period. Production is limited to a maximum of 200,000 cubic yards over the life of the 10-year permit, and designation of the Monument does not affect the limits on production.<sup>16</sup>
- **Potash.** While USGS surveys have assessed potential for potash in the northeastern panhandle of BENM (an area within the boundaries of the Moab Master Leasing Plan prior to designation), no sites in this area were identified as Potash Leasing Areas in the most recent Moab Master Leasing Plan (2016). BLM has denied all potash prospecting permit applications received from 2008 to 2015, primarily because they were inconsistent with protection of multiple resource values use (such as natural or cultural use) in the area.<sup>17</sup>
- **Uranium.** While there are no active mining operations on USFS-managed land, there are 78 active unpatented mining claims for uranium. There are no mining claims for uranium on BLM-managed land. The uranium ore in the Manti-La Sal National Forest is low grade, affecting the ability of the local industry to compete economically on the world market.<sup>18</sup> Uranium prices are volatile and, though currently higher than historical prices, have been trending downward since peaking in 2008.<sup>19</sup>

- **Timber.** The Proclamation does not affect existing laws, regulations, and policies followed by USFS or BLM associated with timber activities. Timber harvest activities such as non-commercial Christmas tree cutting and collection of wood for posts and firewood are allowed by permit on both BLM and USFS-managed land. For BLM-managed lands, no information is available on the level of magnitude of these activities strictly within Monument boundaries, however within the boundaries of the Monticello Field Office the total estimated value of permit

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<sup>16</sup> Supply and demand conditions determine how much is produced annually within the overall limit on production. BLM receives a royalty of \$1.08 per cubic yard (\$0.66 per ton) of mineral production. The national average price for sand and gravel used in construction in 2016 was \$8.80/metric ton ([https://minerals.usgs.gov/minerals/pubs/commodity/sand\\_&\\_gravel/construction/mcs-2017-sandc.pdf](https://minerals.usgs.gov/minerals/pubs/commodity/sand_&_gravel/construction/mcs-2017-sandc.pdf)).

<sup>17</sup> Potash production depends largely on market forces. U.S. consumption of potash was down in 2016 owing to a drop in agricultural use in the first half of the year and lower industrial usage, primarily in oil well-drilling mud additives. The world potash market in 2016 was marked by weak demand in the first half of the year, mainly in China and India, the largest consumers of potash. This excess supply resulted in lower prices, and reduced production. The average price of potash in 2016 was \$360 per ton.

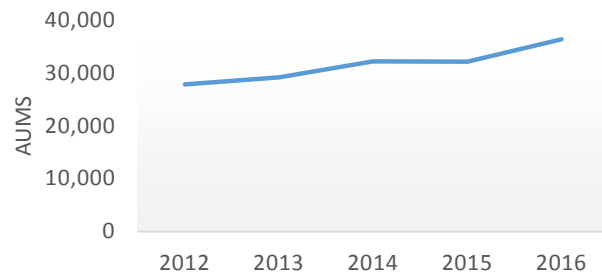
<sup>18</sup> Manti-La Sal National Forest Land and Resource Management Plan, 1986.

<sup>19</sup> <https://www.eia.gov/uranium/marketing/>.

sales for harvesting firewood, wooded posts, and Christmas trees was about \$12,000 in FY 2016.<sup>20</sup> There have not been any recent commercial timber activities on USFS-managed land. The Monument proclamation allows for the continuation of all pre-designation timber activities.

- Forage.** The Monument proclamation allows for the continuation of all pre-designation grazing activities, including maintenance of stock watering facilities. The allotments that are wholly or partially contained within the boundaries of BENM include 50,469 permitted Animal Unit Month (AUMs)<sup>21</sup> on BLM-managed land and 11,078 AUMs permitted on USFS-managed land. Figure 3 shows the number of AUMs billed by BLM annually over 2012-2016. In 2016, there were about 36,400 billed AUMs on BLM-managed land and about 9,700 billed AUMs<sup>22</sup> on USFS-managed land.

Figure 3. BLM AUMs Billed, 2012-2016



- Cultural, archeological, and historic resources.** Indigenous communities may utilize natural resources to an extent and in ways that are different from the general population, and the role that natural resources play in the culture of these indigenous communities may differ from that of the general population. Culturally important sites and unique natural resources, by definition, have limited or no substitutes. Recognizing this is a critical consideration in land management because it may affect consideration of tradeoffs. Activities currently undertaken by tribal members include hunting, fishing, gathering, wood cutting, and the collection of medicinal and ceremonial plants, edible herbs, and materials for crafting items like baskets and footwear.

According to the Utah State Historic Preservation Office, as of Feb. 6, 2017, there are 8,480 recorded archaeological sites and four archaeological districts within BENM. The following archaeological districts are either completely within or partially within BENM: Butler Wash, Grand Gulch, Natural Bridges, and the Salt Creek Archaeological District. More than 70 percent of the sites are prehistoric (pre-dating the 1800s). These prehistoric sites include pottery and stone tool (lithic) scatters, the remains of cooking features (hearths), storage features such as adobe granaries and subsurface stone lined granaries, prehistoric roads, petroglyphs, pictographs and cliff dwellings. The remaining sites are historic and include debris scatters, roads, fences, and uranium and vanadium mines from World War II and the Cold War. About 9% of the BLM-managed portion of BENM has been surveyed for cultural resources.

The USFS-managed portion of BENM includes 2,725 known cultural sites and features an area containing over 2,027 Puebloan sites, most of which are *Pueblo I*. The *Pueblo I* culture is limited

<sup>20</sup> This does not necessarily represent a market value.

<sup>21</sup> BLM measures an AUM as the amount of forage needed to sustain one cow and her calf, one domestic horse, or 5 sheep or goats for one month. <https://www.blm.gov/programs/natural-resources/rangelands-and-grazing/livestock-grazing/fees-and-distribution>.

<sup>22</sup> USFS billed 7,335 Head Months in 2016, which were converted to AUMs using a conversion factor of 1.32.

to only a few locations and the USFS-managed portion of BENM contains the only high elevation communities of this era. These sites include hunting camps and blinds, ceremonial sites, granaries, stone quarries, villages and residences, agricultural systems, kilns, rock art, and shrines, as well as protohistoric sweat lodges and hogans. Only 15-20% of the USFS-managed portion of BENM has been surveyed for cultural resources.

### *Multiple Use and Tradeoffs Among Resource Uses*

This section presents some information to help understand land management tradeoffs.

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(b) (5) DPP



Table 3. Summary of BENM Activities and Economic Values, FY 2016

Activities	Level of annual activity	Economic Value	Timing	Drivers of current and future levels of activity
Recreation	FY 2016: 530,892 visitor days (BLM) 35,000 visitors (USFS)	\$54.19/visitor-day <sup>a</sup>	Visitation could continue indefinitely if landscape resources remain intact and of sufficient quality.	Societal preferences for outdoor recreation; disposable income; changing individual preferences for work and leisure time
Oil, gas, coal production	Little or none to date, see “Oil and gas” section for more information	FY 2016 average prices <sup>b</sup> : -crude oil (WTI): \$41.34/bbl -natural gas: \$2.29/mcf -coal (subbituminous): \$12.08/ton	Development of energy and non-energy minerals is subject to market forces (worldwide supply and demand, prices). Mineral extraction is non-renewable and occurs only as long as the resource is economically feasible to produce.	Market prices of energy commodities affect both supply and demand. Local and regional cost considerations related to infrastructure and transportation are also relevant.
Non-energy Minerals	34,813 tons <sup>c</sup> of sand and gravel (average of 2011-2015 production)	National average price for sand and gravel (2016): \$8.80/ton <sup>d</sup>		Market prices of non-energy commodities affect both supply and demand. Mineral production is limited to 200,000 cubic yards over a 10-year period per the existing resource management plan.
Grazing	2016 billed AUMs: 36,402 AUMs (BLM) 9,682 AUMs (USFS)	2016 grazing fee: \$2.11/AUM	Grazing could continue indefinitely if forage resources are managed sustainably.	Market prices for cattle and sheep and resource protection needs and range conditions (due to drought, fire, etc.) can affect AUMs permitted and billed.
Cultural resources	Indigenous communities often use natural resources to an extent and in ways that are different from the general population, and the role that natural resources play in the culture of these indigenous communities may differ from that of the general population. Culturally important sites and unique natural resources, by definition, have limited or no substitutes. Recognizing this is a critical consideration in land management because it may affect consideration of tradeoffs. BENM contains substantial cultural resources that have not been fully surveyed. Tribes use the sacred sites within BENM for hunting; fishing; gathering; wood cutting; and for collection of medicinal and ceremonial plants, edible herbs, and materials for crafting items like baskets and footwear.			
Benefits of nature	Services provided by nature underpin all sectors of a local economy. As many of these services are not sold in markets, we have limited information on their prices or values. Specific benefits related to BENM include protection of crucial habitats for deer, elk, desert bighorn sheep, pronghorn, and endemic plant species that inhabit rare habitat types such as hanging gardens.			

<sup>a</sup> This value represents the estimated consumer surplus associated with general recreation for the Intermountain region from the USGS Benefit Transfer Toolkit (<https://my.usgs.gov/benefit-transfer/>). Consume surplus represents values individuals hold for goods and services over and above expenditures on those goods and services.

<sup>b</sup> All prices are from EIA.gov

<sup>c</sup> Reported average production of 21,396 cubic yards converted to tons using a conversion factor of 1.63 cu yards/ton.

<sup>d</sup> USGS Mineral Commodity Survey [https://minerals.usgs.gov/minerals/pubs/commodity/sand\\_&\\_gravel\\_construction/mcs-2017-sandc.pdf](https://minerals.usgs.gov/minerals/pubs/commodity/sand_&_gravel_construction/mcs-2017-sandc.pdf)